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**NEW INSECTICIDES THAT SHOW RESIDUAL
TOXICITY TO ADULT HOUSE FLIES**

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Use Pesticides Safely
FOLLOW THE LABEL

U.S. DEPARTMENT OF AGRICULTURE

+
NEW INSECTICIDES THAT SHOW RESIDUAL TOXICITY TO ADULT
HOUSE FLIES X

By H. G. Wilson, J. B. Gahan, and G. C. LaBrecque /
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Since 1945, one of the most useful methods of controlling house flies (*Musca domestica* L.)^{1/} has been the application of insecticide residues to the interior surfaces of buildings. However, during this period, it has frequently been necessary to change insecticides because house flies have developed resistance to materials within 2 or 3 years after extensive use. Resistance to insecticides is now so serious in Florida that alternate chemicals are greatly needed if the application of residual sprays is to continue as a recommended method of controlling house flies. LaBrecque et al.^{2/} screened 150 compounds for this purpose, and within the past 3 years, the present authors have continued the screening of 168 more compounds, mostly organophosphorous compounds and carbamates, as residual toxicants for house flies.

This recent screening was accomplished by 25 series of duplicate tests, in which candidate materials were compared with malathion or ronnel or both as standards against a strain of house flies that has been maintained in the laboratory since 1943 without exposure to insecticides. This colony was originally established with flies from a dairy in Orlando, Fla., at a time when residual-type sprays had not been developed. Acetone solutions of each compound were sprayed on plywood panels at the rate of 1 gram of active ingredient per square meter. The panels were tested 1 week after treatment, again at 4 weeks, and every 4 weeks thereafter for 24 weeks, or until they became ineffective, whichever occurred first. Panels were considered ineffective when they failed to produce at least 90 percent mortality of house flies. A sufficient number of panels was sprayed with each insecticide to avoid using any surface twice.

^{1/} Diptera: Muscidae.

^{2/} LaBrecque, G. C., Wilson, H. G., and Gahan, J. B. Residual effectiveness of some insecticides against house flies. U. S. Dept. Agr. ARS 33-103, 11 pp. 1965.

A rapid knockdown is a highly desirable characteristic for a residual treatment, provided the insects do not recover after leaving the treated surface. Knockdown counts were therefore made after the flies had been in contact with the treated surface for 30 minutes during an initial exposure made 1 week after treatment of the panels. In each test, 20 female house flies, 4 to 5 days old, were exposed under half sections of petri dishes on the treated panels for 60 minutes; then they were transferred to cylindrical screen cages, provided a sugar-water solution in pads of absorbent cotton, and held 24 hours, at which time mortality counts were made. The results are given in table 1.

The following 10 compounds were effective throughout the 24 weeks:

Benzo[*b*]thien-4-yl methylcarbamate (ENT-27041)
1-(2-Bromo-4,5-dichlorophenyl)-2-chlorovinyl dimethyl phosphate
(ENT-27019)
2-Bromo-1-(2,4-dichlorophenyl)vinyl dimethyl phosphate (ENT-27043)
2-Chloro-1-(2,4-dibromophenyl)vinyl dimethyl phosphate (ENT-25840)
2-Chloro-1-(2,4-dichlorophenyl)vinyl dimethyl phosphate (ENT-25818)
O,O-Diethyl phosphorothioate O-ester with 3-hydroxycoumarin (ENT-27144)
2,3-Dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate (ENT-27164)
2,3-Dihydro-2-methyl-7-benzofuranyl methylcarbamate (ENT-27324)
O-Isopropyl ethylphosphonodithioate S-ester with N-(mercaptomethyl)=
phthalimide (ENT-27014)
Methyl N-[(methylcarbamoyl)oxy]thioacetimidate (ENT-27341)

Two other compounds killed 90 to 100 percent of the house flies for 20 weeks, 151 showed this degree of effectiveness for 1 week or less, and the remaining 31 materials were effective for 4 to 12 weeks. The period during which the standards produced at least 90 percent mortality ranged from 0 to 4 weeks for malathion and 1 to 8 weeks for ronnel.

Mention of chemical compounds in this publication is not intended as a recommendation. No product should be used in insect control unless it is registered for the specific use intended, as clearly shown on the product label.

Table 1.--Number of weeks compounds produced at least 90 percent mortality and percent knockdown and mortality obtained after 1 week of aging

Chemical	:	:	:	Results obtained	
				after aging for 1 week	Mortality
			Weeks	Knockdown	
			effective	in 30 minutes	in 24 hours
			Number	Percent	Percent
<u>Series 1</u>					
1-(2-Bromo-4,5-dichlorophenyl)-2-chlorovinyl dimethyl phosphate (ENT-27019)			24	13	93
1-(4-Bromo-2,5-dichlorophenyl)-2-chlorovinyl dimethyl phosphate (ENT-27021)			20	3	98
O-(4-Bromo-2,5-dichlorophenyl) O,O-dimethyl phosphorothioate (ENT-27162)			12	68	100
2-Bromo-1-(2,4-dichlorophenyl)vinyl dimethyl phosphate (ENT-27043)			24	85	100
2-Chloro-1-(2,5-dichlorophenyl)vinyl dimethyl phosphate (ENT-27018)			12	5	100
Cyclic O,O-2,2-dimethyltrimethylene diethylphosphoramidothioate (ENT-27084)			0	0	0
O,O-Diethyl phosphorothioate S-ester with N-(mercapto-methyl)phthalimide (ENT-25706)			0	0	0
O-Ethyl O-[2-(ethylthio)-6-methyl-4-pyrimidinyl] ethylphosphonothioate (ENT-25733)(formerly ENT-25819)			8	61	100
Malathion (ENT-17034)			0	8	83
<u>Series 2</u>					
Benzo[b]thien-4-yl methylcarbamate (ENT-27041)			24	3	100
O-2-Chloroallyl O-(<i>alpha,alpha</i> ,trifluoro-4-nitro-m-tolyl) methylphosphonothioate (ENT-25789)			0	0	3
p-Chlorophenyl phenyl ether (ENT-32895)			0	0	0
m-Cym-5-yl methylcarbamate (ENT-27300)			8	3	100
O-2,4-Dichlorophenyl O-ethyl ethylphosphonothioate (ENT-25798)			1	0	100
O-2,5-Dichlorophenyl O-ethyl ethylphosphonothioate (ENT-25799)			0	0	3

Table 1.--Continued.

Chemical	: : : : : : : : : effective : in 30 minutes : in 24 hours	Weeks	Series 2 (continued)		Results obtained	
			Number	Percent	Percent	after aging for 1 week
			0	0	0	3
2,4-Dimethylbenzyl diethylcarbamate (ENT-32901)			0	0	0	0
Dimethyl phosphate ester with <i>p</i> -hydroxybenzenesulfonamide (ENT-25641)			0	0	0	0
<i>O</i> , <i>O</i> -Dimethyl phosphorodithioate <i>S</i> -ester with 2-mercapto- <i>N</i> -(2-methoxyethyl)acetamide (ENT-27160)			0	0	0	0
1-Methoxy-4-phenoxybenzene (ENT-32896)			0	0	0	0
<i>N</i> - <i>m</i> -Tolylmaleimide (ENT-32932)			0	0	0	0
Trichloro-1,2-cyclobutanedicarbonitrile (ENT-50648)			0	0	0	3
Malathion (ENT-17034)			4	8	8	93
Series 3						
<i>O</i> , <i>O</i> -Diethyl phosphorodithioate <i>S</i> -ester with mercapto-2-propanone diethyl mercaptole (ENT-27070)			0	0	0	5
<i>O</i> , <i>O</i> -Diethyl <i>O</i> -2-pyrazinyl phosphorothioate (ENT-25580)			4	28	28	100
<i>O</i> , <i>O</i> -Dimethyl phosphorodithioate <i>S</i> -ester with mercapto-2-propanone diethyl mercaptole (ENT-27072)			0	0	0	3
5-Oxohexanenitrile (ENT-26936)			0	0	0	0
Malathion (ENT-17034)			0	0	0	0
Series 4						
Diethyl mercaptosuccinate <i>S</i> -ester with <i>O</i> -ethyl ethyl=phosphonodithioate (ENT-27009)			0	0	0	78
3,4-Dihydro-2- <i>H</i> -pyran-2-carbonitrile (ENT-50645)			0	0	0	3
<i>O</i> -Ethyl ethylphosphonodithioate <i>S</i> -ester with <i>N</i> -(2-mercaptoethyl)dimethanesulfonamide (ENT-27013)			0	0	0	3
<i>O</i> -Isobutyl ethylphosphonodithioate <i>S</i> -ester with <i>N</i> -(mercaptomethyl)phthalimide (ENT-27015)			4	0	0	100
<i>O</i> -Isopropyl ethylphosphonodithioate <i>S</i> -ester with <i>N</i> -(mercaptomethyl)phthalimide (ENT-27014)			24	0	0	1/75
Malathion (ENT-17034)			1	0	0	95

Series 5

1,1-Dichloro-2,2-bis(<i>p</i> -chlorophenyl)cyclopropane (ENT-27085)	0	0	80
3-(Dimethylamino)- <i>p</i> -tolyl methylcarbamate (ENT-27108)	0	50	70
<i>O,O</i> -Dimethyl phosphorodithioate <i>S</i> -ester with 2-[(2-mercaptoethyl)sulfinyl]- <i>N</i> -methylpropionamide (ENT-27113)	0	0	0
<i>O,O</i> -Dimethyl phosphorodithioate <i>S</i> -ester with 2-[2-(mercaptoethyl)thio]- <i>N</i> ,2-dimethylpropionamide (ENT-27112)	0	0	0
<i>O,O</i> -Dimethyl phosphorodithioate <i>S</i> -ester with 3-(mercaptoethyl)-2-benzoxazolinone (ENT-27110)	0	0	25
<i>O</i> -Ethyl ethylphosphonodithioate <i>S</i> -ester with 10-(mercaptoacetyl)phenothiazine (ENT-27114)	0	0	5
<i>O</i> -Ethyl ethylphosphonodithioate <i>S</i> -ester with 2-[(mercaptoethyl)thio]- <i>N</i> -methylacetamide (ENT-27038)	0	0	55
<i>O</i> -Methyl <i>S</i> -phenyl methylphosphonodithioate (ENT-25961)	0	0	3
3,4,5-Trimethylphenyl methylcarbamate (ENT-25843)	4	50	100
Malathion (ENT-17034)	1	0	98

Series 6

<i>O,O</i> -Diethyl phosphorodithioate <i>S</i> -ester with 6-chloro-3-(mercaptomethyl)-2-benzoxazolinone (ENT-27163)	0	0	50
2,3-Dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate (ENT-27164)	24	95	100
<i>O,O</i> -Dimethyl <i>S</i> -[(2-methyl-1,3-oxathiolan-2-yl)methyl] phosphorodithioate (ENT-27071)	0	0	3
<i>S</i> -4,6-Dimethyl-2-pyrimidinyl <i>O</i> -ethyl <i>O</i> -isopropyl phosphorodithioate (ENT-27123)	1	0	100
<i>S</i> -4,6-Dimethyl-2-pyrimidinyl <i>O</i> -ethyl <i>O</i> -propyl phosphorodithioate (ENT-27122)	1	0	100
1,2,3,4,7,7-Hexachloro-5,6-bis(chloromethyl)-2-norbornene (ENT-27053)	4	0	93
2-[(Mercaptomethyl)thio]ethyl ethylcarbamate <i>S</i> -ester with <i>O</i> -isopropyl <i>O</i> -methyl phosphorodithioate (ENT-27179)	0	0	3
Phenothiazine 5-oxide (solution in Polysorbate 80) (ENT-17437-X)	0	0	3
Malathion (ENT-17034)	0	0	40

Table 1.--Continued.

Chemical	Results obtained	
	Weeks	after aging for 1 week
	: effective : in 30 minutes : in 24 hours	: Knockdown : Mortality
Series 7		
	Number	Percent
5- <i>sec</i> -Butyl-2-chlorophenyl methylcarbamate (ENT-27128)	0	3
2,2-Dichloro-1,1-bis(<i>p</i> -chlorophenyl)ethyl hydroperoxide (ENT-27181)	0	0
0-2,4-Dichlorophenyl <i>S</i> -propyl methylphosphonodithioate (FNT-27185)	0	0
0,0-Diethyl phosphorodithioate <i>S</i> -ester with 1-(mercapto=acetyl)-1-methylurea (ENT-25874)	0	0
0,0-Diethyl phosphorodithioate <i>S</i> -ester with 3-(mercapto=methyl)-2-benzothiazolinone (FNT-25873)	0	0
0,0-Diethyl phosphorodithioate <i>S</i> -ester with 3-(mercapto=methyl)-2-benzoxazolinone (ENT-25871)	0	0
0,0-Dimethyl phosphorodithioate <i>S</i> -ester with 4-(mercapto=methyl)-2-methoxy- Δ^2 -1,3,4-thiadiazolin-5-one (ENT-27193)	0	0
0-Methyl <i>S,S</i> -dipropyl phosphorotriithioate (ENT-27184)	0	0
Pentachloro-3-(2,2-dichlorocyclopropyl)-2,2-dimethyl= norbornane (FNT-25875)	0	0
0-Phenyl <i>S</i> -propyl methylphosphonodithioate (ENT-27186)	0	0
Malathion (ENT-17034)	0	0
		48
		15
Series 8		
	Number	Percent
Chloro-1,2-cyclobutanedicarbonitrile (FNT-50492)	0	0
2-Chloro-1-(2,4-dibromophenyl)vinyl dimethyl phosphate (FNT-25840)	24	18
2-Chloro-1-(2,4-dichlorophenyl)vinyl dimethyl phosphate (FNT-25818)	24	43
6-Chloro-3,4-xylyl methylcarbamate (ENT-25736)	0	3
<i>N</i> -(1,1a,3,3a,4,5,5a,5b,6-Decachlorooctahydro-1,3,4-metheno-2 <i>H</i> -cyclobuta[<i>cd</i>]pentalen-2-yl) ethyl <i>N</i> -carboxyglycinate (FNT-27155)	0	0
		75
		8

Series 8 (continued)

1,1a,3,3a,4,5,5,5a,5b,6-Decachlorooctahydro-2-methyl-1,3,4-metheno-2 <i>H</i> -cyclobuta[<i>cd</i>]pentalen-2-ol (ENT-27153)	0	0	5
Diethyl mercaptosuccinate propyl methylphosphono=trithioate (ENT-27188)	0	0	23
<i>O</i> , <i>O</i> -Diethyl phosphorothioate <i>O</i> -ester with 3-hydroxy= coumarin (ENT-27144)	24	90	100
Ethyl 1,1a,3,3a,4,5,5,5a,5b,6- <i>ac</i> achlorooctahydro-2-hydroxy-1,3,4-metheno-2 <i>H</i> -cyclobuta[<i>cd</i>]pentalene-2-levulinate (ENT-27154)	0	0	3
Hexamethylphosphoric triamide (ENT-50882)	0	0	0
<i>O</i> -Isopropyl <i>S</i> - <i>p</i> -tolyl (chloromethyl)phosphonodithioate (ENT-25834)	1	3	100
Malathion (ENT-17034)	0	0	23

Series 9

<i>O</i> - <i>p</i> -Chlorophenyl <i>O</i> -ethyl ethylphosphonothioate (ENT-25795)	1	5	100
Chlorotriphenyltin (ENT-25207)	0	0	3
<i>S</i> -[[(2,5-Dichlorophenyl)thio]methyl] <i>O</i> , <i>O</i> -diethyl phosphorodithioate (ENT-25585)	0	0	15
<i>O</i> , <i>O</i> -Dimethyl phosphorothioate <i>O</i> -ester with 3-chloro-4-hydroxybenzonitrile (ENT-25837)	8	88	100
<i>O</i> -Ethyl phenylphosphonothioate <i>O</i> -ester with <i>p</i> -hydroxy= benzonitrile (ENT-25832)	12	3	100
4-Hydroxy-2-mercaptopbutyric acid <i>gamma</i> -lactone <i>S</i> -ester with <i>O</i> , <i>O</i> -diethyl phosphorodithioate (ENT-27211)	8	0	100
Hydroxytriphenyltin (ENT-28009)	0	0	0
1-Myristoylpyrrolidine (ENT-32866)	0	0	3
Triphenyltin acetate (ENT-25208)	0	0	0
Malathion (ENT-17034)	1	0	100

Series 10

<i>S</i> -4-Chloro- <i>m</i> -tolyl <i>O</i> -ethyl ethylphosphonodithioate (ENT-27045)	1	0	98
Dichlorvos (ENT-20738)	0	0	3
<i>O</i> , <i>O</i> -Dimethyl phosphorothioate <i>O</i> , <i>O</i> -diester with 4,4'-thiodiphenol (ENT-27165)	0	0	3

Table 1.--Continued.

Chemical	:	:	:	Results obtained	
				after aging for 1 week	Mortality
	Weeks	Knockdown	in 30 minutes	in 24 hours	
	effective				
Series 10 (continued)					
	Number	Percent	Percent		
	0	0	0		0
2-[(Mercaptomethyl)thio]ethyl carbamate <i>S</i> -ester with <i>O</i> -isopropyl <i>O</i> -methyl phosphorodithioate (ENT-27046)	0	0	0		60
Malathion (ENT-17034)					
Series 11					
<i>O</i> , <i>O</i> -Dimethyl <i>S</i> -[(2-methyl-1,3-dithiolan-2-yl)methyl] phosphorodithioate (ENT-27073)	0	3	0		5
<i>O</i> , <i>O</i> -Dimethyl <i>O</i> -[4-(methylthio)-3,5-xylyl] phosphoro- thioate (ENT-25684)	12	0	0		100
Fenthion (ENT-25540)	12	0	0		100
Malathion (ENT-17034)	0	0	0		83
Series 12					
<i>O</i> -[2-Chloro-1-(2,4-dichlorophenyl)vinyl] <i>O</i> , <i>O</i> -diethyl phosphorothioate (ENT-27097)	8	0	0		100
<i>O</i> , <i>O</i> -Dimethyl [ethyl(2-hydroxypropyl)thiocarbamoyl]= phosphoramidothioate (ENT-27034)	0	0	0		0
<i>O</i> , <i>O</i> -Dimethyl <i>S</i> -9-thiabicyclo[4.2.1]nonenyl phosphorodi- thioate (ENT-27158)	0	0	0		0
<i>O</i> -Ethyl <i>S</i> -phenyl ethylphosphonodithioate (ENT-25796)	1	0	0		98
Malathion (ENT-17034)	1	0	0		95
Series 13					
<i>o</i> - <i>sec</i> -Butylphenyl methylcarbamate (ENT-27212)	0	0	0		0
<i>o</i> -2-Cyclopenten-1-ylphenyl methylcarbamate (ENT-27214)	0	0	0		5
<i>o</i> -Cyclopentylphenyl methylcarbamate (ENT-27213)	0	0	0		5
Diethoxyphosphinyl 1-ethoxy- <i>N</i> -propylformimidoyl disulfide (ENT-27027)	0	0	0		0
<i>O</i> , <i>O</i> -Diethyl <i>O</i> -2-pyrazinyl phosphorothioate (ENT-25580)	0	0	0		20

<u>Series 13 (continued)</u>			
<i>O,O</i> -Dimethyl phosphorodithioate <i>S</i> -ester with 2-ethoxy-4-(mercaptomethyl)-Δ ² -1,3,4-thiadiazolin-5-one (ENT-27238)	4	0	100
<i>O</i> -Ethyl methylphosphonothioate <i>O</i> -ester with 2-chloro-4-hydroxybenzonitrile (ENT-27234)	4	0	100
<i>O</i> -Isopropyl <i>O</i> -methyl <i>O</i> - <i>p</i> -nitrophenyl phosphorothioate (ENT-27248)	4	0	100
Methylcarbamic acid ester with salicylaldehyde diethyl mercaptal (ENT-27156)	0	0	0
Malathion (ENT-17034)	0	0	65
Ronnel (ENT-23284)	1	0	100
<u>Series 14</u>			
<i>O,O</i> -Diethyl <i>S</i> -9-thiabicyclo[4.2.1]nonenyl phosphoro=dithioate (ENT-27159)	0	0	0
<i>o</i> -[1-(Methoxymethyl)allyl]phenyl methylcarbamate (ENT-27157)	0	0	0
Ronnel (ENT-23284)	4	0	100
<u>Series 15</u>			
<i>S</i> -[[<i>(p</i> -Chlorophenyl)thio]methyl] <i>O</i> -methyl methylphos=phonodithioate (ENT-27180)	0	0	53
<i>O,O</i> -Dimethyl [(2-hydroxyethyl)methylthiocarbamoyl]=phosphoramidodithioate (ENT-27239)	0	0	0
<i>O,O</i> -Dimethyl phosphorodithioate <i>S</i> -ester with <i>N,N'</i> -diethyl-2-mercaptomalonamide (ENT-25828)	0	0	3
<i>O,O</i> -Dimethyl phosphorodithioate <i>S</i> -ester with <i>N</i> -formyl-2-mercapto- <i>N</i> -methylacetamide (ENT-27257)	0	0	10
<i>O,O</i> -Dimethyl phosphorothioate <i>O</i> -ester with 5-chloro=salicylonitrile (ENT-27235)	4	90	100
Ethyl 7-hydroxy-4-methyl-2-oxo-2 <i>H</i> -1-benzopyran-3-acetate <i>O</i> -ester with <i>O,O</i> -diethyl phosphorothioate (ENT-27126)	0	0	0
Methyl 7-hydroxy-4-methyl-2-oxo-2 <i>H</i> -1-benzopyran-3-acetate <i>O</i> -ester with <i>O,O</i> -diethyl phosphorothioate (ENT-27124)	0	0	0
<i>O</i> -Methyl <i>S</i> -phenyl ethylphosphonodithioate (ENT-27249)	0	0	23
5,6,7,8-Tetrahydro-1-naphthyl methylcarbamate (ENT-27253)	0	0	3
Tributyl(oleoyloxy)tin (ENT-27261)	0	0	0
3-(Tributylstannyl)-1-propanethiol acetate (ENT-27260)	0	0	0
Ronnel (ENT-23284)	1	0	100

Table 1.--Continued.

Chemical	: : :			: : :		
	: : :			: : :		
	: : :			: : :		
	Weeks	Knockdown	Mortality	Weeks	Knockdown	Mortality
	effective	in 30 minutes	in 24 hours	effective	in 30 minutes	in 24 hours
<u>Series 16</u>						
3-Amino-4-heptanol (ENT-28044)	0	0	0	0	0	0
<i>S-p-tert</i> -Butylphenyl <i>O</i> -methyl ethylphosphonodithioate (ENT-27251)	4	0	90	4	0	90
1-Chloro-4-(2-nitropropenyl)benzene (ENT-28079)	0	0	0	0	0	0
<i>O,O</i> -Diethyl phosphorodithioate <i>S</i> -ester with 3-(mercapto=methyl)-2,4-thiazolidinedione (ENT-27295)	0	0	0	0	0	0
<i>O,O</i> -Dimethyl phosphorodithioate <i>S</i> -ester with 2-mercapto- <i>N,N'</i> -dimethoxy- <i>N,N'</i> -dimethylsuccinamide (ENT-27310)	0	0	0	0	0	0
Ethyl mercaptoacetate propyl methylphosphonotrithioate (ENT-27187)	0	0	15	0	0	15
2-[Ethyl(1-propylbutyl)amino]ethyl diethylcarbamate (crude) (ENT-32918-X)	0	0	0	0	0	0
<i>Eupatorium glandulosum</i> , deobase extract of aerial portion (ENT-41379)	0	0	0	0	0	0
1,2,3,4,7,7-Hexachloro-5-(2,2,3,3-tetrafluorocyclobutyl)-2-norbornene (ENT-27256)	1	0	98	1	0	98
<i>O</i> -Methyl <i>S-p</i> -tolyl ethylphosphonodithioate (ENT-27250)	1	0	100	1	0	100
1-Palmitoylpyrrolidine (ENT-32867)	0	0	0	0	0	0
Ronnel (ENT-23284)	1	0	100	1	0	100
<u>Series 17</u>						
<i>O,O</i> -Diethyl phosphorodithioate <i>S</i> -ester with <i>N</i> -(2-bromo-1-mercaptoethyl)phthalimide (ENT-27269)	0	0	3	0	0	3
<i>O,O</i> -Diethyl <i>O</i> -3,5,6-trichloro-2-pyridyl phosphorothioate (ENT-27311)	4	45	100	4	45	100
<i>O,O</i> -Dimethyl phosphorodithioate <i>S</i> -ester with 3-(mercapto=methyl)-2,4-thiazolidinedione (ENT-27296)	0	0	5	0	0	5
<i>O</i> -Ethyl <i>O</i> -[<i>p</i> (methylsulfinyl)phenyl] ethylphosphonothioate (ENT-27277)	0	0	8	0	0	8

<u>Series 17 (continued)</u>			
O-Ethyl phenylphosphonothioate O-ester with p-hydroxybenzonitrile (ENT-25832)	20	0	100
Ronnel (ENT-23284)	4	0	98
<u>Series 18</u>			
3-Hydroxy-N-methyl- <i>cis</i> -crotonamide dimethyl phosphate (ENT-27129)	0	0	5
Ronnel (ENT-23284)	1	0	100
<u>Series 19</u>			
S-[(2,4-Dichlorophenoxy)methyl] O-ethyl ethylphosphono=dithioate (ENT-27298)	0	0	45
O,O-Dimethyl phosphorothioate O-ester with 4-hydroxy-m-anisonitrile (ENT-27230)	0	0	3
O-Ethyl (chloromethyl)phosphonothioate O-ester with 4-hydroxy-m-anisonitrile (ENT-27227)	0	0	70
m-(Methoxymethoxy)phenyl methylcarbamate (ENT-25908)	0	0	0
2-Methyl-2-(methylthio)propionaldehyde O-(methylcarbamoyl)=oxime (ENT-27093)	1	48	100
1,2,3,4,5,6,7,8-Nonachloro-3a,4,7,7a-tetrahydro-4,7-methanoindan (ENT-27005)	0	0	3
Trichlorfon (ENT-19763)	0	0	0
Ronnel (ENT-23284)	1	0	100
<u>Series 20</u>			
3-Allyl-1-methyl-1-phenyl-2-thiourea (ENT-51379)	0	0	0
S-4-Chloro-m-tolyl O-methyl ethylphosphonodithioate (ENT-27309)	1	0	100
Cyclic ethylene (diethoxyphosphinothioyl)dithioimido=carbonate (ENT-25809)	0	0	8
O,O-Diethyl phosphorodithioate, S-ester with N-(2-chloro-1-mercaptopoethyl)phthalimide (ENT-27320)	0	0	83
Diethyl styrylphosphonate (ENT-27078)	0	0	0
O,O-Dimethyl phosphorodithioate S-ester with N-(2-chloro-1-mercaptopoethyl)phthalimide (ENT-27321)	0	0	38
O-Ethyl S,S-dipropyl phosphorodithioate (ENT-27318)	0	0	0
O-[3-(Isopropylthio)-4-nitrophenyl] O,O-dimethyl phosphorothioate (ENT-27326)	0	0	3

Table 1.--Continued.

Chemical	:	:	:	Results obtained	
				after aging for 1 week	Mortality
	Weeks	Knockdown	:	:	:
	effective	in 30 minutes	:	in 24 hours	:
Series 20 (continued)					
	Number	Percent	Percent	Percent	Percent
2-Naphthyl isothiocyanate (ENT-28338)	0	0	0	3	
S-Phenyl butylthiocarbamate (ENT-33101)	0	0	0	0	
Ronnel (ENT-23284)	1	0	0	100	
Series 21					
m-Cym-5-yl methylcarbamate (ENT-27300)	4	30	98		
O,O-Diethyl phosphorodithioate S-ester with N-(2-cyanoethyl)-2-mercaptoacetanilide (ENT-27312)	0	0	0		
2,3-Dihydro-2-methyl-7-benzofuranyl methylcarbamate (ENT-27324)	24	100	100		
Ronnel (ENT-23284)	4	3	100		
Series 22					
O,O-Dimethyl phosphorothioate O,O-diester with 4,4'-thiodiphenol (ENT-27330)	0	0	0		
Ronnel (ENT-23284)	4	0	100		
Series 23					
Benzaldehyde bis(2-amino-2-methylpropyl) acetal (ENT-28084)	0	0	0		
O-(4-Bromo-2,5-dichlorophenyl) O-ethyl phenylphosphonothioate (ENT-27343)	0	0	8		
2-sec-Butyl-4,6-dinitrophenyl 2-chlorobutyrate (ENT-27215)	0	0	0		
S-6-Chloropiperonyl 2,2-dimethyl-3-(2-methylpropenyl)=thiocyclopropanecarboxylate (ENT-31506)	0	0	0		
2,2-Dimethyl-3-(2-methylpropenyl)cyclopropanecarboxylic acid ester with N-(hydroxymethyl)-1-cyclohexene-1,2-dicarboximide (ENT-27339)	0	95	38		
4-Hydroxy-2-mercaptoputyric acid gamma-lactone S-ester with O,O-diethyl phosphorothioate (ENT-27333)	0	0	0		

<u>Series 23 (continued)</u>			
Methyl <i>N</i> -[(methylcarbamoyl)oxy]thioacetimide (ENT-27341)	24	40	100
Ronnel (ENT-23284)	8	0	100
<u>Series 24</u>			
Diethoxyphosphinyl 1-ethoxy- <i>N</i> -phenylformimidoyl disulfide (ENT-27022)	0	0	0
Diethoxyphosphinyl 1-ethoxy- <i>N</i> -propylformimidoyl disulfide (ENT-27027)	0	0	3
Diethoxyphosphinyl 1-isopropoxy- <i>N</i> -phenylformimidoyl disulfide (ENT-27026)	0	0	0
Diethoxyphosphinyl 1-methoxy- <i>N</i> -phenylformimidoyl disulfide (ENT-27025)	0	0	0
<i>O</i> , <i>O</i> -Diethyl <i>SO</i> -[2-(ethylthio)ethyl] phosphoro(monothio=peroxoate) (ENT-27024)	0	0	0
<i>O</i> , <i>O</i> -Diethyl phosphorothioate, <i>SO</i> -derivative with 4'-nitroacetophenone oxime (ENT-27029)	0	0	0
<i>O</i> , <i>O</i> -Dimethyl [ethyl(2-hydroxyethyl)thiocarbamoyl]=phosphoramidothioate (ENT-27023)	0	0	0
<i>O</i> , <i>O</i> -Dimethyl [(2-hydroxyethyl)propylthiocarbamoyl]=phosphoramidothioate (ENT-27032)	0	0	0
<i>SO</i> -2,4-Dinitrophenyl <i>O</i> , <i>O</i> -diethyl phosphoro(monothio=peroxoate) (ENT-27030)	0	0	0
<i>SO</i> -3,5-Dinitro- <i>o</i> -tolyl <i>O</i> , <i>O</i> -diethyl phosphoro(monothio=peroxoate) (ENT-27031)	0	0	0
<i>O</i> -Ethyl (chloromethyl)phosphonothioate (ENT-27028)	12	0	100
<i>O</i> -Ethyl <i>O</i> -(<i>p</i> -hydroxybenzonitrile) methylphosphonothioate <i>O</i> -ester with <i>p</i> -hydroxybenzonitrile (ENT-27033)	12	3	100
Ronnel (ENT-23284)	8	0	100
<u>Series 25</u>			
6-(Dimethylamino)thymyl methylcarbamate (ENT-27338)	0	0	0
<i>N</i> , <i>N</i> -Dimethyloctadecanamide, 50 percent mixture with related <i>N</i> , <i>N</i> -dimethylamides (ENT-3291-X)	0	0	0
Ronnel (ENT-23284)	4	0	100

1/ All mortality counts for 24-week duration of test were above 90 percent, with this exception.

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